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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/080,507	02/22/2002	Jae Chang Jung	00939B-068710US	1185
20350	7590	04/19/2004	EXAMINER	
TOWNSEND AND TOWNSEND AND CREW, LLP TWO EMBARCADERO CENTER EIGHTH FLOOR SAN FRANCISCO, CA 94111-3834			LEE, SIN J	
			ART UNIT	PAPER NUMBER
			1752	

DATE MAILED: 04/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/080,507

Applicant(s)

JUNG ET AL.

Examiner

Sin J. Lee

Art Unit

1752

[Handwritten signature]

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-21 is/are rejected.
- 7) ☒ Claim(s) 4 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☒ Certified copies of the priority documents have been received in Application No. 09/465,111.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>07152002</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. In view of the amendment filed on January 23, 2004, previous rejections on claims 1-3 and 5-19 over Kajita et al'316 are hereby withdrawn. Kajita does not teach or suggest present limitation of claims 1 and 5 "at least one of R₁, R₂, R₃, and R₄ represent straight or branched C₁₋₁₀ ester including at least one hydroxyl group, straight or branched C₁₋₁₀ ketone including at least one hydroxyl group, straight or branched C₁₋₁₀ carboxylic group including at least one hydroxyl group, straight or branched C₁₋₁₀ acetal including at least one hydroxyl group". Also, Kajita does not teach or suggest the present crosslinking monomer of claims 20 and 21 comprising 1,3-butanediol diacrylate or 1,4-butanediol diacrylate.

2. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Claim Rejections - 35 USC § 102

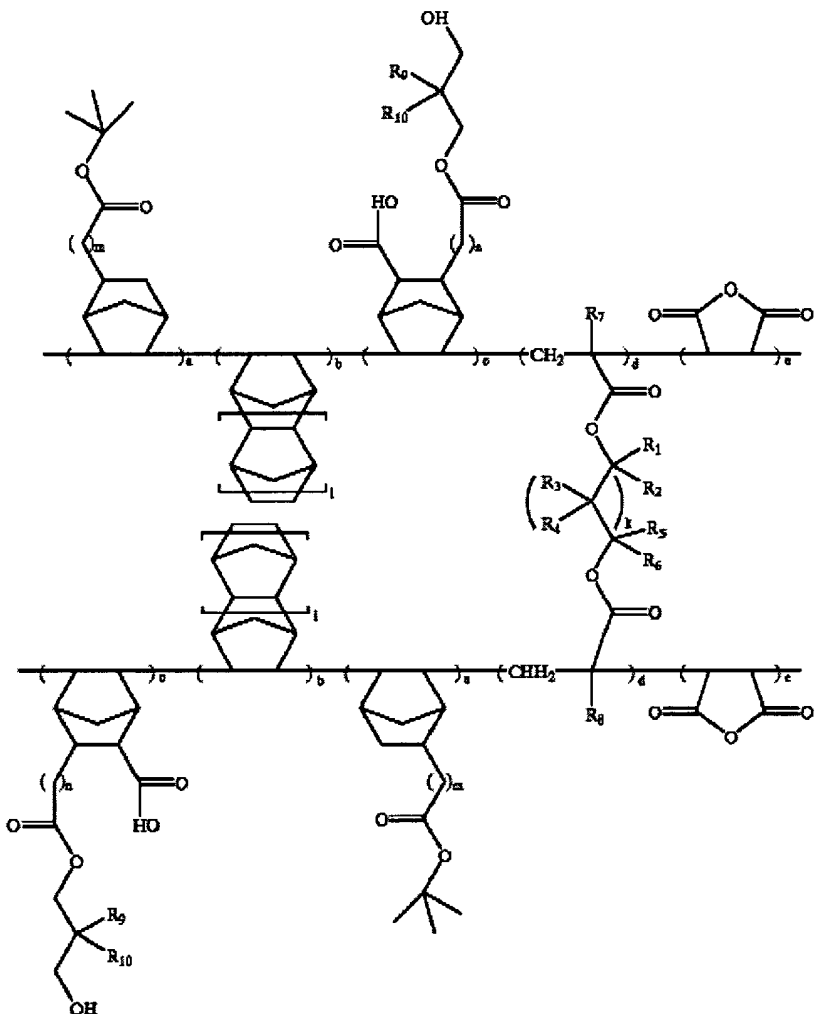
(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-3 and 5-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee et al (6,403,281 B1).

The applied reference has a common inventor with the instant application.

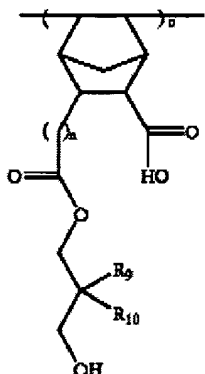
Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Lee teaches (col.6, lines 18-67, col.7, lines 48-53) the following polymer of the formula 10 as one of the two preferred photoresist polymers of his invention:



As shown above, Lee's polymer contains *two* of the following repeating unit;

Art Unit: 1752



in which n is an integer from 0-2, and R_9 and R_{10} are H, or linear or branched C_1 - C_5 alkyl. Based on this teaching, one of ordinary skill in the art would immediately envisage the repeating unit shown above in which n is 0, and both of R_9 and R_{10} are H (because there are only several choices given for the variables n , R_9 and R_{10}). The monomer which forms such repeating unit teaches present monomer of Chemical Formula 4 of claim 1 and present alicyclic monomer of the formula shown in claim 5: present k would be 1; p would be 0; R_5 would be H; R_2 and R_3 would be H atoms; R_4 would be a straight C_1 carboxylic acid; and R_1 would be a straight C_4 ester including one hydroxyl group. Therefore, Lee teaches present component (a) two or more alicyclic olefin derivatives of the Chemical Formula 4 in present claim 1 as well as the two alicyclic monomers of the formula as shown in present claim 5.

Lee teaches that R_1 - R_6 in the repeating unit "d" in his polymer (as shown above) can independently be H, or linear or branched C_1 - C_5 alkyl group. Therefore, one of ordinary skill in the art would immediately envisage all of R_1 - R_6 to be H atoms (because there are only several choices given for the variables R_1 - R_6). The monomer which forms such repeating unit teaches present crosslinking monomer of the formula shown

Art Unit: 1752

in present claims 1 and 5: present m would be an integer of 1, and present R would be a straight C₃ alkyl group. Therefore, Lee teaches present component (b) of claim 1 and the present crosslinking monomer of claim 5. Also, with respect to present claim 5, Lee teaches (col.9, lines 19-26) that the process for producing his photoresist polymer comprises the steps of (a) admixing his crosslinker monomer and at least one other suitable photoresist monomer, and a polymerization initiator; and (b) providing conditions sufficient to produce the photoresist polymer. Therefore, Lee teaches present inventions of claims 1 and 5.

Since Lee's polymer shown above includes the maleic anhydride repeating unit, Lee teaches present invention of claim 2.

With respect to present claim 3, Lee teaches that in his photoresist copolymer shown above, the repeating unit "c" can be present in 1-30 mol%, the repeating unit "e" can be present in 10-50 mol %, the repeating unit "d" can be present in 0.1-48 mol%. Based on this teaching, one of ordinary skill in the art would immediately envisage the repeating unit "c" to be present in 1 mol% (because 1 mol % is included as the lower end of the taught range), the repeating unit "e" to be present 10 mol% (because 10 mol% is included as the lower end of the taught range), and the repeating unit "d" to be present in 0.1 mol% (because 0.1 mol% is included as the lower end of the taught range). Since these numbers fall within the present ranges of claim 3, Lee teaches present invention of claim 3.

With respect to present claims 6-10, Lee teaches (col.9, lines 19-44) that in producing his photoresist polymer, the admixture of his crosslinker monomer and at

Art Unit: 1752

least one other suitable photoresist monomer, and the polymerization initiator is dissolved in an organic solvent such as cyclohexanone, tetrahydrofuran, dimethylformamide, dioxane, methylethylketone, benzene, toluene and mixture thereof. Lee also teaches that the polymerization conditions include heating the admixture to temperature in the range of 60-70°C for 4-24 hours under an inert atmosphere, preferably under nitrogen or an argon atmosphere. Lee furthermore teaches that the polymerization initiator is selected from the group consisting of AIBN, acetylperoxide, laurylperoxide, tert-butyl peracetate, tert-butyl hydroperoxide, and di-tert-butylperoxide. Therefore, Lee teaches present inventions of claims 6-10.

With respect to present claims 11-13, Lee teaches (col.9, lines 51-65) a photoresist composition comprising his photoresist polymer, an organic solvent, and a photoacid generator, and the examples for the photoacid generator given by Lee in col.9, lines 54-65 are the same as those listed in present claim 13. Therefore, Lee teaches present inventions of claims 11-13.

With respect to present claims 14-18, Lee teaches (col.10, lines 28-48) a process for forming a photoresist pattern comprising the steps of (a) coating a photoresist composition on a substrate of a semiconductor element to form a photoresist film, (b) exposing the photoresist film to light using a light source such as ArF, KrF, EUV, VUV, E-beam, X-ray and ion beam, and (c) developing the exposed photoresist film using an aqueous solution of TMAH. Lee furthermore teaches that preferably, a baking step before and/or after the exposure step is performed at temperature in the range of 70-200°C. Therefore, Lee teaches present inventions of claims 14-18.

Lee also teaches (col.10, lines 48-51) a semiconductor device which is manufactured using his photoresist composition. Therefore, Lee also teaches present invention of claim 19.

Claim Rejections - 35 USC § 103

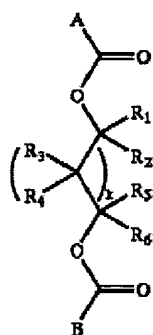
4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

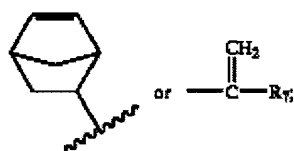
5. Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (6,403,281 B1).


As described in Paragraph 3 above, Lee teaches present alicyclic olefin derivatives of the Chemical Formula 4 of claim 20 and the alicyclic monomer of the formula shown in claim 21.

As to the present cross-linking monomer comprising 1,3-butanediol diacrylate or 1,4-butanediol diacrylate, Lee teaches a crosslinker monomer of the following formula



A is a moiety of the formula




 or $\text{---C}(\text{CH}_2)\text{---R}_2$

Lee furthermore teaches that R₇ and R₈ are preferably H or CH₃; R₁-R₆ independently represent H, or linear or branched C₁-C₅ alkyl group, and that k is an integer from 0 to 3. Based on Lee's teaching, it would have been obvious to choose Lee's crosslinker monomer of the formula shown above in which A and B both are moiety of the formula -C(=CH₂)-H, k is 2, and R₁-R₆ are all H atoms (*in which case, the monomer would be the presently claimed 1,4-butanediol diacrylate*) with a reasonable expectation of obtaining photoresist composition having improved pattern profile, enhanced adhesiveness, excellent resolution, sensitivity, durability and reproducibility. Therefore, Lee's teaching would render obvious present inventions of claims 20 and 21.

Double Patenting

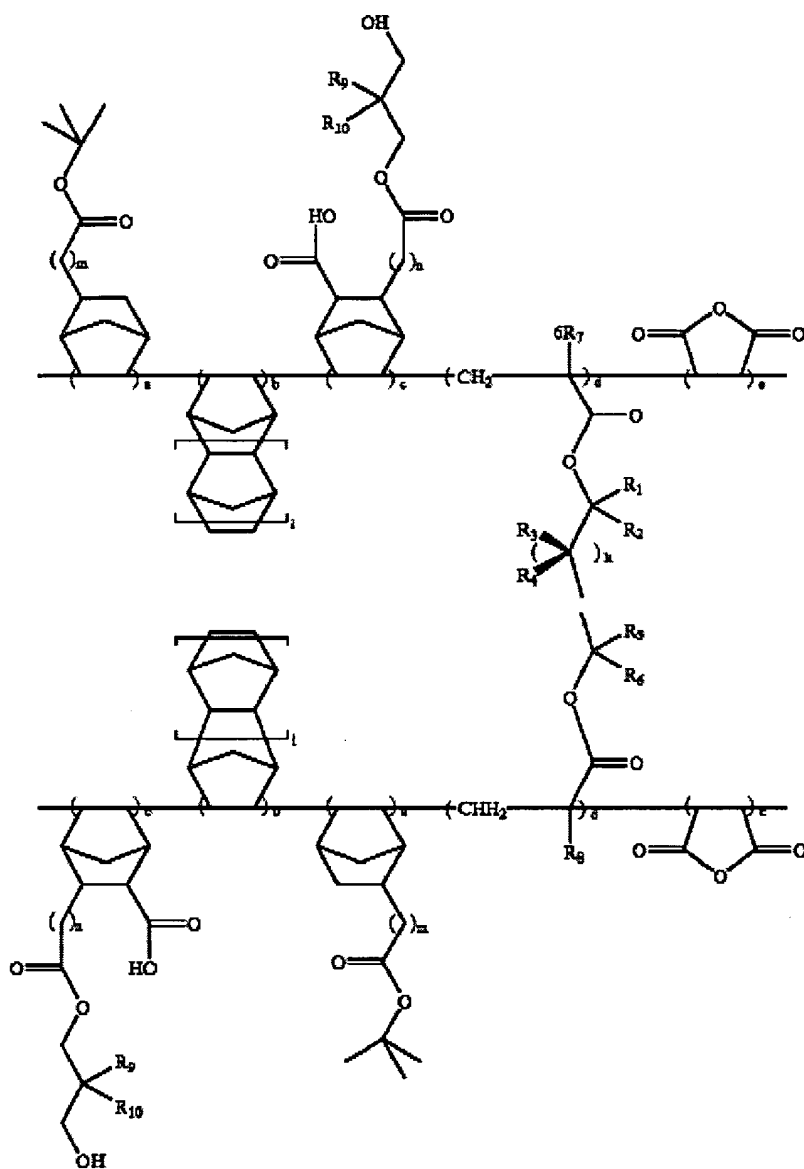
6. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

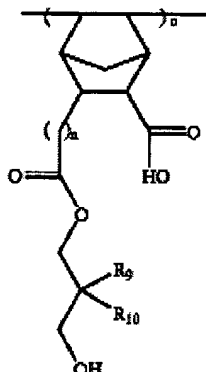
Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

7. Claims 1-3, 5, 7-17, and 19-21 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 4-8, 10, 12, 16-19, and 21 of U.S. Patent No. 6,403,281 B1. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons: Claim 4 of Pat.'281 teaches the following photoresist copolymer;

Art Unit: 1752



The polymer shown above contains *two* of the following repeating unit;



in which n is an integer from 0-2, and R_9 and R_{10} are H, or linear or branched C_1 - C_5 alkyl. Based on this teaching, it would have been obvious to one of ordinary skill in the art to obtain the repeating unit shown above in which n is 0, and both of R_9 and R_{10} are H (because there are only several choices given for the variables n , R_9 and R_{10}) with a reasonable expectation of obtaining the photoresist copolymer of claim 4 of Pat.'281.

The monomer which forms such repeating unit teaches present monomer of Chemical Formula 4 of claim 1 and present alicyclic monomer of the formula shown in claim 5: present k would be 1; p would be 0; R_5 would be H; R_2 and R_3 would be H atoms; R_4 would be a straight C_1 carboxylic acid; and R_1 would be a straight C_4 ester including one hydroxyl group. Therefore, claim 4 of Pat.'281 renders obvious the present component (a) two or more alicyclic olefin derivatives of the Chemical Formula 4 in present claim 1 as well as the two alicyclic monomers of the formula as shown in present claim 5.

Claim 4 of Pat.'281 also teaches that R_1 - R_6 in the repeating unit "d" in the polymer (as shown above) can independently be H, or linear or branched C_1 - C_5 alkyl group.

Therefore, it would have been obvious to one of ordinary skill in the art to choose all of R_1 - R_6 to be H atoms (because there are only several choices given for the variables R_1 -

Art Unit: 1752

R₆) with a reasonable expectation of obtaining the photoresist copolymer of claim 4 of Pat.'281. The monomer which forms such repeating unit teaches present crosslinking monomer of the formula shown in present claims 1 and 5: present m would be an integer of 1, and present R would be a straight C₃ alkyl group. Therefore, claim 4 of Pat.'281 renders obvious present component (b) of claim 1 and the present crosslinking monomer of claim 5. Also, with respect to present claim 5, claim 5 of Pat.'281 teaches that the process for producing the photoresist polymer comprises the steps of (a) admixing the crosslinker monomer and at least one other suitable photoresist monomer, and a polymerization initiator; and (b) providing conditions sufficient to produce the photoresist polymer. Therefore, Pat.'281 renders obvious present inventions of claims 1 and 5.

Since the polymer shown above includes the maleic anhydride repeating unit, claim 4 of Pat.'281 also teaches present invention of claim 2.

With respect to present claim 3, claim 4 of Pat.'281 teaches that in the photoresist copolymer shown above, the repeating unit "c" can be present in 1-30 mol%, the repeating unit "e" can be present in 10-50 mol %, the repeating unit "d" can be present in 0.1-48 mol%. Since these numbers overlap with the present ranges of claim 3, claim 4 of Pat.'281 would render obvious present invention of claim 3. In the case "where the [claimed] ranges overlap or lie inside ranges disclosed by the prior art," a *prima facie* case of obviousness would exist which may be overcome by a showing of unexpected results, In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

With respect to present claims 7-10, claims 5-8 of Pat.'281 teach that in producing the photoresist polymer, the admixture of the crosslinker monomer and at least one other suitable photoresist monomer, and the polymerization initiator is dissolved in an organic solvent such as cyclohexanone, tetrahydrofuran, dimethylformamide, dioxane, methylethylketone, benzene, toluene and mixture thereof. Pat.'281 also teaches that the polymerization conditions include heating the admixture to temperature in the range of 60-70°C for 4-24 hours under an inert atmosphere. Pat.'281 furthermore teaches that the polymerization initiator is selected from the group consisting of AIBN, acetylperoxide, laurylperoxide, tert-butyl peracetate, tert-butyl hydroperoxide, and di-tert-butylperoxide. Therefore, Pat.'281 renders obvious present inventions of claims 7-10.

With respect to present claims 11-13, claims 10 and 12 of Pat.'281 teach a photoresist composition comprising the photoresist polymer, an organic solvent, and a photoacid generator, and the examples for the photoacid generator given in claim 12 of Pat.'281 are the same as those listed in present claim 13. Therefore, Pat.'281 renders obvious present inventions of claims 11-13.

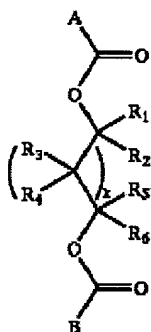
With respect to present claims 14-17, claims 16 and 19 of Pat.'281 teach a process for forming a photoresist pattern comprising the steps of (a) coating a photoresist composition on a substrate of a semiconductor element to form a photoresist film, (b) exposing the photoresist film to light using a light source such as ArF, KrF, EUV, VUV, E-beam, X-ray and ion beam, and (c) developing the exposed photoresist film. Claims 17 and 18 of Pat.'281 furthermore teaches that a baking step

Art Unit: 1752

before and/or after the exposure step is performed at temperature in the range of 70-200°C. Therefore, Pat.'281 renders obvious present inventions of claims 14-17.

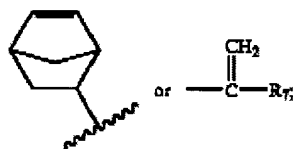
Claim 21 of Pat.'281 teaches a semiconductor device which is manufactured using his photoresist composition. Therefore, Pat.'281 also renders obvious present invention of claim 19.

With respect to present claims 20 and 21, as described above, Pat.'281 teaches present alicyclic olefin derivatives of the Chemical Formula 4 of claim 20 and the alicyclic monomer of the formula shown in claim 21. As to the present cross-linking monomer comprising 1,3-butanediol diacrylate or 1,4-butanediol diacrylate, claim 1 of Pat.'281 teaches a crosslinker monomer of the following formula



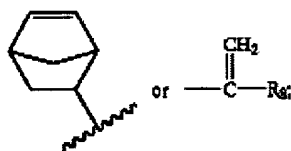
where

A is a moiety of the formula



Art Unit: 1752

B is a moiety of the formula



Claim 1 of Pat.'281 furthermore teaches that R_7 and R_8 can be H or linear or branched $\text{C}_1\text{-C}_5$ alkyl group; $\text{R}_1\text{-R}_6$ independently represent H, or linear or branched $\text{C}_1\text{-C}_5$ alkyl group, and that k is an integer from 0 to 3. Based on this teaching, it would have been obvious to choose the crosslinker monomer of the formula shown above in which A and B both are moiety of the formula $-\text{C}(=\text{CH}_2)\text{-H}$, k is 2, and $\text{R}_1\text{-R}_6$ are all H atoms (*in which case, the monomer would be the presently claimed 1,4-butanediol diacrylate*) with a reasonable expectation of obtaining the photoresist polymer of claim 1 of Pat.'281. Therefore, the teaching of Pat.'281 would render obvious present inventions of claims 20 and 21.

Allowable Subject Matter

8. Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims since Lee et al (6,403,281 B1) does not teach or fairly suggest either of those present polymers of claim 4.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is 571-272-1333. The examiner can normally be reached on Monday-Friday from 9:00 am EST to 5:30 pm EST.

Art Unit: 1752

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F. Huff, can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

S. J. Lee

S. Lee
April 12, 2004

Mark F. Huff

MARK F. HUFF
SUPERVISORY PATENT EXAMINER
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